

## CENTRAL INTELLIGENCE AGENCY

## INFORMATION REPORT

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## Comment:

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1. Read Podberesye for Podbereshye throughout the report.

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SECRETDetails of the HEINKEL Types

- He. 49 Double-decker, single-seater, land plane, but also with floats, replaced by He. 51.
- He. 70 Well-known.
- He. 51 Double-decker, single-seater, according to RLM specifications, produced in quantity, also with floats.
- He. 111 Well-known, compromise between Lufthansa and Military requirements.
- He. 112 Single-decker, single-seater.
- He. 114) Both sea planes, both successful in sea plane competition.  
He. 115) He. 115 was built in quantity. The type of float developed was sold to many German firms.
- He. 119 2 engines in fuselage, smallest drag coefficient ever measured at the HEINKEL Works, ordered by RICHTHOFEN, but immediately cancelled by his successor.
- He. 100 Edet's 100 kms. record with normal aircraft and engine, 746 kms. per hour with cut wing area and increased engine performance.
- He. 64 Aircraft for circuit of Europe Competition.
- He. 74 Small single-seater, double-decker training aircraft.
- He. 118 Dive bomber.
- He. 116 Mail aircraft for the South Atlantic with four Hirth engines, aircraft very successful, but engines not reliable. Closed range of 12500 km. achieved.
- He. 176 Special rocket aircraft, wing 9% thick, maximum thickness at 41.5% of chord, armoured, rocket fuel consumption higher than expected.
- He. 178 Jet aircraft, jet thrust only two-thirds of the thrust expected.
- He. 177 Very small control forces were specified and achieved (up to 750 kms). Experience with "normal" pilots showed that this was a mistake. Twin-engine 2 x 601 satisfactory, increased performance 2 x 605 had connecting rod troubles.
- He. 280 Single-seater with two HEINKEL Jets. The Jet engines were not finished in time. (The Jumo Jet was too large).
- He. 162 So-called People's Fighter (Volksjäger). The cut off wing tips proved to be dangerous at large angles of Yaw; engine controls not in order.
- He. 219 Night fighter.

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SECRET-24-11. Summary 

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There are very good Russian engineers, but the percentage of good engineers is at present very small, smaller than in the West. There should be enough engineers available for the most important armament tasks, but not enough for general (civil) use. The better training now received by the young engineers will certainly expand the possibilities of the Russian industry and research in future.

Technical progress in Russia, in particular in aircraft technology, would have most certainly been impossible without the many good Western publications. The latter are indispensable for the Russians even today, and of quite inestimable value for their future technical progress.

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Hydraulics Works and a Powder Rocket Works, but they were not the chief designers of these works. These Russian engineers were superior to [redacted] Section chief deputies, and could easily have been representatives of German firms at similar negotiations. Successful development plants of the Russian armament industry get good engineers. The numerous less important and yet successful Russian Works (non-armament) have at present in many cases insufficiently trained engineers. Development works pay higher salaries than mass production works, and the armaments industry pays more than the consumer goods industry. Successful plants pay much higher bonuses. Influential chief designers can offer to particularly competent engineers Special Personal Contracts of the Ministry with salaries considerably above the standard pay.

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[REDACTED]

These "black boxes" were referred to as "standard components" and altogether weighed about 100 kg.

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Behind the "black boxes" was to be installed the radar-operated gun sight and the optical sight, and connected thereto, the computer. The sighting and computer equipment would weigh about 35 kg. [REDACTED] the computer in its present form was too slow for this new aircraft, but that it would be suitably modified prior to fitment.

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40. The scanner had two beam widths, a wide one for searching and a narrow one for tracking the target after location. Attacks were made from the rear and the rockets with which the aircraft was armed, were automatically fired at a range of between 500 and 1500 metres. During an attack two salvos of rockets were to be automatically fired as the attacking aircraft closed on the target.

When the target is visible the pilot employs the optical sight, and when the target cannot be seen, the equipment is switched so that the radar image is thrown into the pilot's line of sight through a system of mirrors (see sketch).

#### 41. Armament of the Delta Wing Fighter

It was decided that the aircraft should carry rockets, not guns, and two methods of arranging the rockets were considered. One method was to store the rockets one behind the other in the rocket tubes with diaphragms between them and exhaust holes suitably placed along the tube length. The second method was to have a vertical magazine at the end of the rocket tube. The first method was the one which was chosen and the aircraft was designed to accommodate two tubes in each wing root.

42. An alternative arrangement which was discussed was to have the tubes around the nose section. [REDACTED]

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[REDACTED] rockets of 82 mm., 106 mm., 127 mm. and 190 mm. calibre were under development. The two in which most interest was being shown were the 82 mm. and 106 mm. calibre which were about 1 metre long. All the rockets were believed to be solid powder type and work was being done on a proximity fuse which was to be about the size of a matchbox. It was expected that the proximity fuse would be ready at the same time as the rockets.

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25. The sighting was either optical (day) or by radar (night or clouds). The sights were gyro stabilised and a computer calculated continuously the required angle of lead which was passed automatically to the sight graticule. The pilot thus had only to keep the cross wire of the sight on the target by steering the aircraft accordingly. Everything else was automatic.

26. As an alternative, an installation of ~~34~~ cannon was also drawn out. These excellent weapons have a rate of fire exceeding 1500 rounds per minute. The 23 mm. calibre gun weighs 33 kg. A special version of 14 mm. calibre with muzzle velocity exceeding 1000 m/Sec weighs 36 kg. (strengthened barrel). In addition to the armament and radar equipment, the single-seater aircraft also carried blind landing equipment and searchlights.

#### Operation

27. The aircraft was to be launched from a trolley by means of powder rockets. It was claimed by the Russians that the rockets they would provide were completely smokeless and only little affected by atmosphere temperature. They were a Tcheck (pre-1939 ?) invention and very much superior to what the Americans were using at the moment. The acceleration during the launch was very high, up to 3 g. After the aircraft had left the trolley, the acceleration continued horizontally till just below  $q_{max}$ . The ascent takes place in a smooth curve with  $\frac{Lift}{Weight}$  constant and approximately 1.5. This passes smoothly into the next part of the trajectory with  $C_L = 0$ . The steepest portion of the trajectory makes an angle of approximately  $70^\circ$  with the horizontal at an altitude of  $\sim 10$  km. Optimum range is obtained with approximately horizontal flight at an altitude of 22 km. and  $M = 1.5$ .

28. The first part of the ascent takes place in this manner at approximately constant  $q$ , whilst towards the end of the climb the aircraft is flying at constant  $M = 1.5$ . (A steeper climb with great centripetal acceleration gives rise to a falling  $q$ ).

The cruising flight of the aircraft takes place at constant  $M = 1.5$  and constant optimum  $C_L$ , with a slight gain in height. At a distance of about 260 km. from the starting point the fuel is exhausted. The aircraft now returns to horizontal flight till the optimum  $M$  number for gliding is reached ( $< 1.0$ ). The landing glide is then carried out at  $M$  optimum =  $f(H)$ .

The total range of the aircraft is about 520 km.

29. The landing takes place without thrust. (It is interesting to note that a small light weight model was made of the high wing version of the  $\Delta$  aircraft. This was catapulted by means of a rubber chord and the flights filmed. This film was subsequently shown to the Committee of Experts).

#### Soviet Turbo-jet Engines

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21. The aircraft possessed a retractable main landing skid (which could rotate slightly about the shock absorbers), a retractable rear skid (in line with the front skid) and two auxiliary wing tip skids, also retractable.

Calculations showed that even with one wing tip touching the ground, the aircraft moves in practically a straight line along the ground provided the front skid can be rotated by a small amount about the vertical axis by the pilot.

The aircraft lands at an angle of incidence of about 25°, the rear skid touching first. Well damped shock absorbers are required to prevent jumping.

## 22. Wing Structure

Several spar systems were calculated with the corresponding wing deformations. It was found that by spacing the rear spars obliquely, the trailing spar root fitting is under shear only and this is preferable to having the normal arrangements of spars at right angles to the fuselage. In the latter case, special stiffening of the root fitting has to be provided for the rear spar.

An alternative Russian proposal of having an oblique leading spar and a straight rear spar (similar to the arrangement in the DFS.346 aircraft) proved much heavier and had insufficient stiffness. The proposed rear displacement of the vertical fin was tested on a small "Vibrakom" model with encouraging results.

## 23. Cabin Equipment (see also para. 33)

Both prone and upright sitting position of the pilot were investigated. The sitting position had to be adopted in order to find room for the night fighter equipment, sights and numerous other accessories required for a fighter. For this equipment, the Russians in general supplied only outline drawings of what were stated to be "obsolescent" models. In this connection it is interesting to note that the Russians claimed that their armoured glass provided protection up to 25 mm. calibre. According to German experience, the German glass did not do this (up to 1945). For the unarmed experimental version of the Delta, a totally different cockpit had been designed.

Both cockpits could be jettisoned.

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24. The Russians preferred rocket armament to cannons. Outline drawings of rockets of 82 and 106 mm. were provided, but rockets of 132 and 190 mm. calibre were stated to be available. The rockets were placed one behind the other in a single launching tube, with gas vent holes spaced between the individual rockets. Two of such tubes were fitted, one on either side of the fuselage. The rockets were fired automatically as soon as the requisite range (~ 1500 m. ?) was reached, but the interval between the firing of the individual rockets could be adjusted. Proximity fuses (the size of a match box) were mentioned.

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18. Proposed Power Plant

It is generally known that the power plant group OKB II was not strong in talent. Russian rockets of suitable performance were apparently not available (or rather not available to the Büro). The Büro had, therefore, to develop its own drive which was inspired by the BMW nitric acid - paraffin rocket. (Dr.) JUNKEN of the Chemistry Section provided a catalysor which when added to the paraffin oil was to ensure instantaneous ignition on meeting the  $\text{HNO}_3$ . Both the acid and the paraffin oil were injected by means of pumps driven by peroxide turbines.

arrangement was as follows:

The rocket

- Two 3-ton thrust units with turbine pump. These are ignited at take-off and burn throughout.
- One 3-ton thrust unit with turbine pump which can be turned either fully on or off.
- One 1.5-ton thrust unit with turbine pump which alone can be regulated down to 500 kg. thrust.

Total thrust = 10.5 tons.

The nitric acid was contained in a part of the fuselage (closely rivetted clad dural). (Tests showed that this material stood up better than the stainless steel proposed by the Russians).

In order to reduce the work of the pumps, the tanks were put under a slight pressure by means of  $\text{CO}_2$  bottles housed in another section of the fuselage (see sketch). The pressure bottles for the peroxide tanks were placed inside the vertical fin.

19. As an alternative to the rocket motor, the provision of jet engines was discussed. This led to some interesting revelations which are treated in detail below (para. 30).

Shape of Models

20. Both the high and mid wing versions had the same shape of wing, a triangle with span = chord, the wing tips being cut off to equal the depth of rudder chord (see sketch).

The profile is symmetrical and has no twist  $\theta = .05$  and tangent of trailing edge  $.10$ .

The nose is elliptical and passes into a parabola without discontinuity in the radius of curvature. The tangent to the rear edge is straight. For this width and rear edge angle, the position of maximum thickness is at .365 chord from the nose. The vertical fin had the same profile and was placed rather more to the rear than is usual in Delta aircraft (according to published information).

All controls are aerodynamically unbalanced and self-locking. The model experiments covered both divided and undivided versions of the

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